

D AND M WATER ASSOCIATION (PWS 6030010) SOURCE WATER ASSESSMENT FINAL REPORT

August 13, 2002



State of Idaho Department of Environmental Quality

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Executive Summary

Under the Safe Drinking Water Act Amendments of 1996, all states are required by the U.S. Environmental Protection Agency (EPA) to assess every source of public drinking water for its relative sensitivity to contaminants regulated by the act. This assessment is based on a land use inventory of the designated assessment area and sensitivity factors associated with the wells and aquifer characteristics.

This report, *Source Water Assessment for D and M Water Association, in Bannock County, Idaho* describes the public drinking water system, the boundaries of the zones of water contribution, and the associated potential contaminant sources located within these boundaries. This assessment should be used as a planning tool, taken into account with local knowledge and concerns, to develop and implement appropriate protection measures for this source. **The results should not be used as an absolute measure of risk, and they should not be used to undermine public confidence in the water system.**

Final susceptibility scores are derived from equally weighting system construction scores, hydrologic sensitivity scores, and potential contaminant/land use scores. Therefore, a low rating in one or two categories, coupled with a higher rating in other categories, results in a final rating of low, moderate, or high susceptibility. With the potential contaminants associated with most urban and heavily agricultural areas, the best score a well can get is moderate. Potential contaminants are divided into four categories: inorganic contaminants (IOCs, i.e. nitrates, arsenic), volatile organic contaminants (VOCs, i.e. petroleum products), synthetic organic contaminants (SOCs, i.e. pesticides), and microbial contaminants (i.e. bacteria). As different wells can be subject to various contamination settings, separate scores are given for each type of contaminant.

The D and M Water Association (PWS 6030010) is a community drinking water system that currently consists of four well sources: Well #1, Well #2, Well #3 and Well #4. The wells are located approximately four miles north of the City of Chubbuck, west of Interstate 15. Water from the wells is pumped directly into the distribution system. The public water system serves approximately 100 persons through 39 unmetered connections.

The potential contaminant sources identified within the delineated time-of-travel (TOT) zone include major transportation corridors (Interstate 15), a major surface water source (Fort Hall Main Canal), and a municipal wastewater land application (WLAP) site. A complete list of potential contaminant sources is provided with this assessment (Table 1).

For the assessment, a review of laboratory tests for D and M Water Association was conducted. In 1998, total coliform bacteria were detected at various locations within the distribution system with one result found at the wellhouse for Well #3. When bacteria were identified in July and November 1998, boil advisories were required. Since November 1998, no total coliform bacteria have been detected in the system. No SOCs or VOCs have been detected in the water samples taken at the sample tap for the wells. However, there have been IOCs and radionuclides (RADs) detected. The wells detected arsenic, barium, chromium, fluoride, gross alpha, gross beta, mercury, and nitrate between 1982 and 2001. All chemical results for the wells did not meet or exceed the maximum contaminant level (MCL) as set by the EPA for each chemical. The June 1989, November 1998, and October 2001 required samples, arsenic was measured at 0.01 mg/L, non-detect, and non-detect respectively. The detection limit for the non-detect results were less than 0.02 mg/L. An independent study conducted in November 1999 by the EPA detected arsenic at 0.0048 mg/L.

All arsenic results for this system, were below the MCL of 0.05 mg/L. In October 2001, the EPA lowered the arsenic MCL to 0.01 mg/L, giving systems until 2006 to comply with the new standard.

The nitrate history (between the years of 1982 and 2001) for the wells show that all samples taken were below the MCL of 10.0 mg/L. Nitrate concentrations for range from 0.78 mg/L to 4.1 mg/L with the peak concentration in September 2000.

The Idaho Department of Environmental Quality (DEQ) in 2001 conducted a Sanitary Survey for D and M Water Association. The survey provides a system overview and lists improvements that should be made by the water system to ensure compliance with DEQ regulations (IDAPA 58.01.08). Improvements made since the last sanitary survey include installation of approved casing vents on Well #1, Well #2 and Well #3 (Carlson, 1999). Making the necessary improvements outlined in the sanitary survey may prolong the life of the wells and reduce the chance of contaminants entering the drinking water system.

The capture zone for the wells intersects a priority area for the inorganic chemical nitrate. The inorganic priority areas are areas where greater than 25% of the wells or springs show constituents higher than primary standards or other health standards. Nitrate can be associated with runoff from fertilizers, leaching from septic tanks/sewage, or erosion of natural deposits.

The susceptibility ratings for the D and M Water Association drinking water system were based upon available information relating to soil drainage characteristics, agricultural land use, system construction, and potential contaminant sources identified within each well's zone of contribution. The final susceptibility ranking for Well #1, Well #2 and Well #3 were high for IOCs, VOCs, SOCs and microbial contaminants. Well #4 rated moderate for IOCs, VOCs, SOCs and microbial contaminants.

This assessment should be used as a basis for determining appropriate new protection measures or re-evaluating existing protection efforts. No matter what ranking a source receives, protection is always important. Whether the source is currently located in a "pristine" area or an area with numerous industrial and/or agricultural land uses that require surveillance, the way to ensure good water quality in the future is to act now to protect valuable water supply resources. If the system should need to expand in the future, new well sites should be located in areas with as few potential sources of contamination as possible, and the site should be reserved and protected for this specific use.

For D and M Water Association, drinking water protection activities should focus on correcting any deficiencies outlined in the sanitary survey. There should be no application or storage of herbicides, pesticides, or other chemicals within 50 feet of a public water system well. The system should continue their efforts to keep the distribution system free of microbial contamination. Any new sources that could be considered potential contaminants that reside within a well's zone of contribution should be investigated and monitored to evaluate the threat of contamination the source may pose in the future. Land uses within most of the source water assessment area are outside the land ownership boundaries of D and M Water Association. Therefore partnerships with federal, state and local agencies, industrial and commercial groups should be established to ensure future land uses are protective of ground water quality. Educating staff and the public about source water will further assist the system in its monitoring and protection efforts.

According to a press release posted on the EPA website (www.epa.gov), the EPA intends to provide up to \$20 million over the next two years for research and development of more cost-effective technologies to help small systems meet the new standard and provide technical assistance to small system operators. EPA has released an issue paper, identifying and summarizing experiences with proven aboveground treatment alternatives for arsenic in ground water, and provides information on their relative effectiveness and cost (EPA 542-S-02-002). The EPA has also stated that it “will work with small communities to maximize grants and loans under current State Revolving Fund and Rural Utilities Service programs of the Department of Agriculture” (USEPA, 2001, para 5).

Due to the time involved with the movement of ground water, drinking water protection activities should be aimed at long-term management strategies even though these strategies may not yield results in the near term. A strong public education program should be a primary focus of any drinking water protection plan. Public education topics could include proper lawn and garden care practices, household hazardous waste disposal methods, proper care and maintenance of septic systems, and the importance of water conservation to name but a few. There are multiple resources available to help communities implement protection programs, including the Drinking Water Academy of the EPA. Drinking water protection activities for agriculture should be coordinated with the Idaho State Department of Agriculture and the Bannock County Soil and Water Conservation District. Since a major transportation corridor intersects the delineation (such as Interstate 15), the Idaho Department of Transportation should be involved in protection efforts. If the system should need to expand in the future, new well sites should be located in areas with as few potential sources of contamination as possible, and the site should be reserved and protected for this specific use.

A system must incorporate a variety of strategies in order to develop a comprehensive drinking water protection plan, be they regulatory in nature (i.e. zoning, permitting) or non-regulatory in nature (i.e. good housekeeping, public education, specific best management practices). For assistance in developing protection strategies please contact the Pocatello Regional Office of the DEQ or the Idaho Rural Water Association.

SOURCE WATER ASSESSMENT FOR D AND M WATER ASSOCIATION, BANNOCK COUNTY, IDAHO

Section 1. Introduction - Basis for Assessment

The following sections contain information necessary to understand how and why this assessment was conducted. **It is important to review this information to understand what the ranking of this source means.** A map showing the delineated source water assessment area and the inventory of significant potential sources of contamination identified within that area are contained in this report. The list of significant potential contaminant source categories and their rankings used to develop this assessment is also attached.

Background

Under the Safe Drinking Water Act Amendments of 1996, all states are required by the U.S. Environmental Protection Agency (EPA) to assess every source of public drinking water for its relative susceptibility to contaminants regulated by the Safe Drinking Water Act. This assessment is based on a land use inventory of the delineated assessment area and sensitivity factors associated with the wells and aquifer characteristics.

Level of Accuracy and Purpose of the Assessment

Since there are over 2,900 public water sources in Idaho, there is limited time and resources to accomplish the assessments. All assessments must be completed by May of 2003. An in-depth, site-specific investigation of each significant potential source of contamination is not possible. **Therefore, this assessment should be used as a planning tool, taken into account with local knowledge and concerns, to develop and implement appropriate protection measures for this source. The results should not be used as an absolute measure of risk, and they should not be used to undermine public confidence in the water system.**

The ultimate goal of the assessment is to provide data to local communities to develop a protection strategy for their drinking water supply system. The Idaho Department of Environmental Quality (DEQ) recognizes that pollution prevention activities generally require less time and money to implement than treatment of a public water supply system once it has been contaminated. DEQ encourages communities to balance resource protection with economic growth and development. The information necessary to develop a drinking water protection program should be determined by the local community and be based upon its own needs and limitations. Wellhead or drinking water protection is one facet of a comprehensive growth plan, and it can complement ongoing local planning efforts.

Section 2. Conducting the Assessment

General Description of the Source Water Quality

D and M Water Association (PWS 6030010) is a community public drinking water system located in Bannock County. The D and M Water Association drinking water system currently consists of four well sources: Well #1 (E0007704), Well #2 (E0007703), Well #3 (E0007708) and Well #4 (E0007705). The wells are located approximately four miles north of the City of Chubbuck west of Interstate 15 (Figure 1). Water from the wells is pumped directly into the distribution system. The public water system serves approximately 100 persons through 39 unmetered connections.

For the assessment, a review of laboratory tests for D and M Water Association was conducted using the State Drinking Water Information System (SDWIS) and hardcopy laboratory results. In 1998, total coliform bacteria were detected at various locations within the distribution system with one result found at the wellhouse for Well #3. When bacteria were identified in July and November 1998, boil advisories were required. Since November 1998, no total coliform bacteria have been detected in the system. No synthetic organic contaminants (SOCs, i.e. pesticides) or volatile organic contaminants (VOCs, i.e. petroleum products) have been detected in the water samples taken for the wells. However, there have been inorganic contaminants (IOCs, i.e. nitrates, arsenic) and radionuclides (RADs) detections. The primary constituents detected at the wells were arsenic, barium, chromium, fluoride, gross alpha, gross beta, mercury, and nitrate between 1982 and 2001. All chemical results for the wells did not meet or exceed the maximum contaminant level (MCL) as set by the EPA for each chemical. The June 1989, November 1998, and October 2001 required samples, arsenic was measured at 0.01 mg/L, non-detect, and non-detect respectively. The detection limit for the non-detect results were less than 0.02 mg/L. An independent study conducted in November 1999 by the EPA detected arsenic at 0.0048 mg/L. All arsenic results for this system, were below the MCL of 0.05 mg/L. In October 2001, the EPA lowered the arsenic MCL to 0.01 mg/L, giving systems until 2006 to comply with the new standard.

The nitrate history (between the years of 1982 and 2001) for the wells show that all samples taken were below the MCL of 10.0 mg/L. Nitrate concentrations range from 0.78 mg/L to 4.1 mg/L with the peak concentration in September 2000.

The capture zone for the wells intersects a priority area for the inorganic chemical nitrate. The inorganic priority areas are areas where greater than 25% of the wells or springs show constituents higher than primary standards or other health standards. Nitrate can be associated with runoff from fertilizers, leaching from septic tanks/sewage, or erosion of natural deposits.

Defining the Zones of Contribution--Delineation

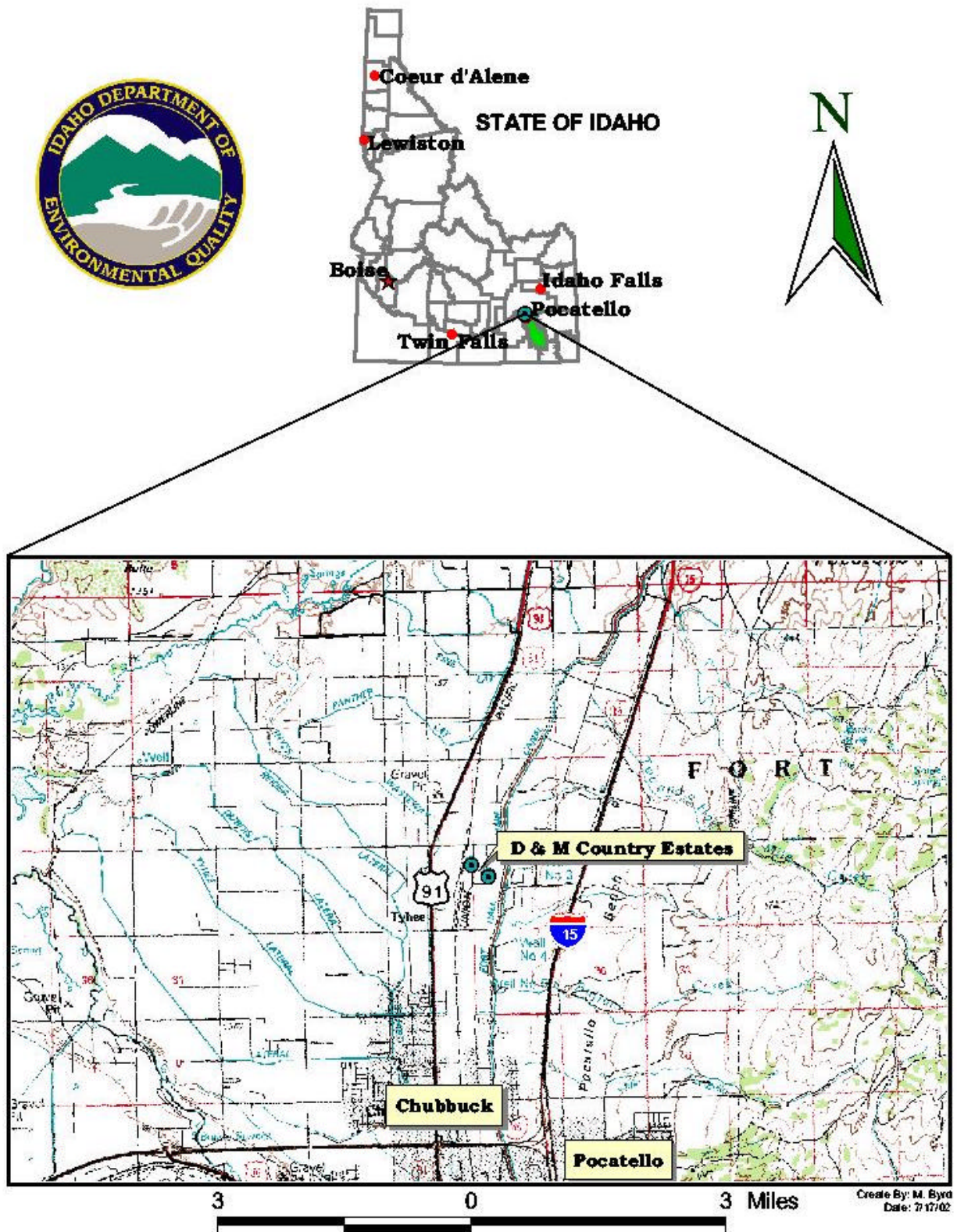
The delineation process establishes the physical area around a well that will become the focal point of the assessment. The process includes mapping the boundaries of the zone of contribution into time-of-travel zones (zones indicating the number of years necessary for a particle of water to reach a pumping well) for water in the aquifer. Washington Group International, Inc. (WGI) was contracted by DEQ to define the public water system's zones of contribution. WGI used a refined computer model approved by the EPA in determining the 3-year (Zone 1B), 6-year (Zone 2), and 10-year (Zone 3) Time-of-Travel (TOT) for water associated with the East Margin Area of the Eastern Snake River Plain (ESRP) hydrologic province. The computer model was assimilated by the WGI using site specific data from a variety of sources including nearby well logs, operator records, and hydrogeologic reports. Although there are four drinking water wells associated with this system, the delineation in this assessment represents all wells based upon similarities in hydrogeologic characteristics. A summary of the hydrogeologic information from the WGI Source Area Delineation Report is provided below.

The East Margin Area encompasses 821 square miles, representing approximately 8 percent of the total area of the ESRP hydrologic province. The majority of the East Margin Area is within Bingham County, with small areas occurring in Bannock, Bonneville, and Power counties.

The regional ESRP aquifer is the most significant aquifer in the East Margin Area and consists primarily of basalt of the Quaternary-aged Snake River Group. However, additional water-bearing units are used for water supply along the margin of the ESRP. In order of decreasing age, the most significant aquifers in the Michaud Flats area are bedded rhyolite (volcanic rock) of the Tertiary-aged Starlight Formation and Quaternary-aged pediment gravels formed by running water, basalt of the Big Hole Formation, and stream deposits of the Sunbeam Formation (see Jacobson, 1982, p. 7, and Corbett, et al., 1980, pp. 6-10). A few shallow domestic wells in the central Michaud Flats area also are completed in Michaud Gravel, which is the shallow water-table aquifer. The American Falls Lake Beds Formation (AFLB) confines the deeper aquifers and averages 80 feet in thickness in the central Michaud Flats area (Jacobson, 1984, p. 6). The AFLB pinches out in the eastern Michaud Flats area near the Portneuf River, effectively combining the shallow and deep stream deposits into a single water table aquifer (Bechtel, 1994, p. 2-2). Other aquifers in the East Margin Area include fractured quartzite that has been developed near Blackfoot, stream deposits near the cities of Firth and Basalt, and pediment gravels in the Gibson Terrace area near Tyhee and Chubbuck.

Public water system (PWS) wells in the East Margin Area of the ESRP province produce water from five different aquifers: the Regional Eastern Snake River Plain aquifer, three alluvial or stream deposited aquifers (Eastern Michaud Flats, Firth/Basalt, and Gibson Terrace/Pocatello Bench), and a quartzite aquifer near Blackfoot. The conceptual model for the Regional Eastern Snake River Plain Aquifer in which the D and M Water Association public water system resides is presented below.

**FIGURE 1 - Geographic Location of D and M Water Association, Bannock County
PWS 6030010**



Regional Eastern Snake River Plain Aquifer

The ESRP is a northeast trending basin located in southeastern Idaho. The 10,000 square miles of the plain are primarily filled with highly fractured layered Quaternary-aged basalt flows of the Snake River Group, which are between layers of rocks formed by sediment deposition along the margins (Garabedian, 1992, p. 5). Quaternary-aged basalts are estimated to be 100 to 1,500 feet thick, with the majority of the area in the range of 100 to 500 feet thick (Whitehead, 1992, Plate 3). Individual basalt flows range from 10 to 50 feet thick, averaging 20 to 25 feet thick (Lindholm, 1996, p. 14). Basalt is thickest in the central part of the eastern plain and thins toward the margins. Whitehead (1992, p. 9) estimates the total thickness of the flows to be as great as 5,000 feet. A thin layer (0 to 100 feet) of windblown and stream-produced sediments overlies the basalt. The plain is bounded on the northeast by rocks of the Yellowstone Group (mainly rhyolite) and Idavada Volcanics to the southwest. These rocks may also underlie the plain (Garabedian, 1992, p. 5). Granite of the Idaho batholith borders the plain to the northwest, along with sedimentary rocks and metamorphic rocks (altered by heat and/or pressure) (Cosgrove et al., 1999, p. 10). The Snake River flows along part of the southern boundary and is the only drainage that leaves the plain. A high degree of connectivity with the regional aquifer system is displayed over much of the river as it passes through the plain. However, some reaches are believed to be perched or separated from the main ground water by unsaturated rock, such as the Lewisville-to-Shelly reach. Rivers and streams entering the plain from the south are tributary to the Snake River. With the exception of the Big and Little Wood rivers, rivers entering from the north vanish into the basalts of the Snake River Plain aquifer that have a higher ability to transmit water.

The layered basalts of the Snake River Group host one of the most productive aquifers in the United States. The aquifer is generally considered unconfined, yet may be confined locally because of interbedded clay and dense unfractured basalt (Whitehead, 1992, p. 26). Whitehead (1992, p. 22) and Lindholm (1996, p. 1) report that well yields of 2,000 to 3,000 gal/min are common for wells open to less than 100 feet of the aquifer. Transmissivities obtained from test data in the upper 100 to 200 feet of the aquifer range from less than 0.1 ft²/sec to 56 ft²/sec (1.0×10^4 to 4.8×10^6 ft²/day; Garabedian, 1992, p. 11, and Lindholm, 1996, p. 18). Lindholm (1996, p. 18) estimates aquifer thickness to range from 100 feet near the plain's margin to thousands of feet near the center. Models of the regional aquifer have used values ranging from 200 to 3,000 feet to represent aquifer thickness (Cosgrove et al., 1999, p. 15).

Regional ground water flow is to the southwest paralleling the basin (Cosgrove et al., 1999; deSonneville, 1972, p. 78; Garabedian, 1992, p. 48; and Lindholm, 1996, p. 23). Reported water table gradients range from 3 to 100 ft/mile and average 12 ft/mile (Lindholm, 1996, p. 22). Gradients steepen at the plain's margin and at discharge locations. The estimated effective ratio of the rock's open space volume to its total volume range from 0.04 to more than 0.25 (Ackerman, 1995, p. 1, and Lindholm, 1996, p. 16).

The majority of aquifer recharge results from surface water irrigation activities (incidental recharge), which divert water from the Snake River and its tributaries (Ackerman, 1995, p. 4, and Garabedian, 1992, p. 11) and locally from canal leakage. Natural recharge occurs through stream losses, direct precipitation, and tributary basin underflow.

Aquifer discharge occurs primarily as seeps and springs on the northern wall of the Snake River canyon near Thousand Springs and near American Falls and Blackfoot (Garabedian, 1992, p. 17). To a lesser degree, discharge also occurs through pumping and underflow.

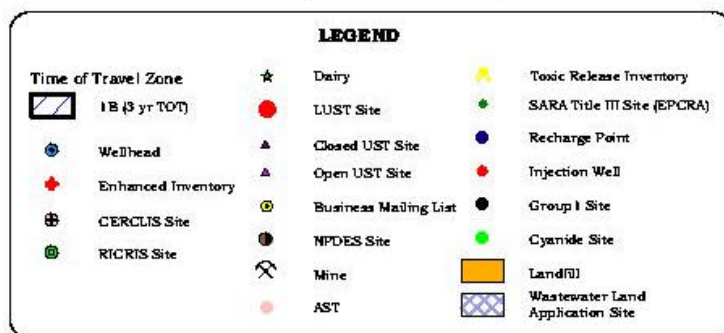
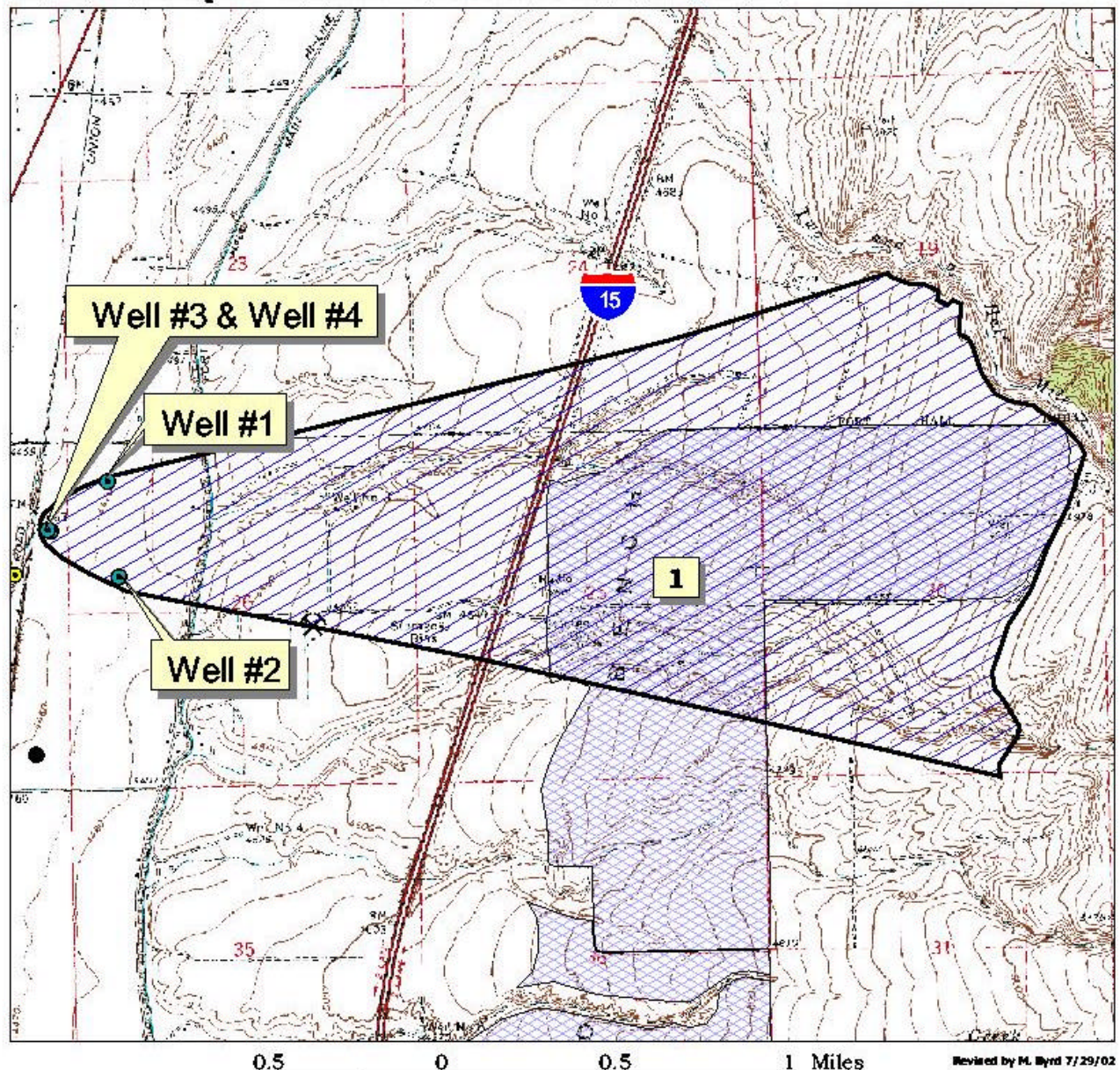
The East Margin Area is among the most transmissive regions of the regional aquifer, therefore it has a higher ability to transmit water. A transmissivity of $21 \text{ ft}^2/\text{sec}$ was used to represent the upper 200 feet of the regional aquifer in the East Margin Area in the three-dimensional USGS ground water flow model (Garabedian, 1992, Plate 6). The equivalent hydraulic conductivity or the rate at which water can move through permeable material is 9,072 ft/day. This value is consistent with the range of hydraulic conductivity, the rate water flows through a cross section, (9,500 to 11,708 ft/day) calculated using data from a constant-rate aquifer test conducted in 1981 (Jacobson, 1982, p. 23). This range was calculated by dividing the estimated transmissivity (228,000 to 281,000 ft^2/day) by the perforated interval of the observation well (24 feet). The geometric mean hydraulic conductivity based on analysis of specific capacity data from PWS wells (135 ft/day) is significantly lower. A published water table map of the Upper Snake River Basin (IDWR, 1997, p. 9) indicates that the ground water flow direction in the ESRP aquifer in the East Margin Area is similar to that depicted at the regional scale (e.g., Garabedian, 1992, Plate 4).

Recharge from precipitation and surface water irrigation in the East Margin Area ranges from less than 10 to more than 20 inches per year (Garabedian, 1992, Plate 8). The low end of the range applies to the area near Blackfoot, while the high end applies to the area on the west side of American Falls Reservoir near Aberdeen.

Kjelstrom (1995, p. 13) reports an annual river loss of 280,000 acre-feet to the regional basalt aquifer for the 27.5-mile Lewisville-to-Shelley reach of the Snake River and 110,000 acre-feet for the 23.5-mile Shelley-to-Blackfoot reach. Annual river gains of 1,900,000 acre-feet for the 36.6-mile Blackfoot-to-Neeley reach are also estimated (Kjelstrom, 1995, p. 13). A seepage study conducted in the fall of 1980 on the Portneuf River showed a gain of about $560 \text{ ft}^3/\text{sec}$ (405,691 acre-feet) for the 13-mile Pocatello-to-American Falls Reservoir reach (Jacobson, 1982, p. 16). The average flow in the Blackfoot River near the city of Blackfoot is low at Station #13068500 (5.2 cfs; USGS, 2001) compared to the flow in the Snake River near the city of Blackfoot at Station #13069500 (2,900 cfs; USGS, 2001).

The delineated source water assessment area for D and M Water Association drinking water wells trends to the east and is conical in shape. The delineation includes only a 3-year TOT and excludes the 6- and 10-year TOT capture zones because the aquifer extent terminates at the mountains to the east. The delineation for the D and M Water Association wells is approximately 3 miles in length with the narrowest area near the wellheads approximately 800 feet wide. The widest area of the delineation to the east is approximately 1.5 miles (Figure 2). The actual data used by WGI in determining the source water assessment delineation are available from DEQ upon request.

**FIGURE 2 - D and M Water Association
Delineation Map and Potential Contaminant Source Locations**



PWS# 6030010
Well #1, Well #2,
Well #3 & Well #4

Identifying Potential Sources of Contamination

A potential source of contamination is defined as any facility or activity that stores, uses, or produces, as a product or by-product, the contaminants regulated under the Safe Drinking Water Act. Furthermore, these sources have a sufficient likelihood of releasing such contaminants into the environment at levels that could pose a concern relative to drinking water sources. The goal of the inventory process is to locate and describe those facilities, land uses, and environmental conditions that are potential sources of ground water contamination. The locations of potential sources of contamination within the delineation areas were obtained by field surveys conducted by DEQ and from available databases.

It is important to understand that a release may never occur from a potential source of contamination provided best management practices are used at the facility. Many potential sources of contamination are regulated at the federal level, state level, or both to reduce the risk of release. Therefore, when a business, facility, or property is identified as a potential contaminant source, this should not be interpreted to mean that this business, facility, or property is in violation of any local, state, or federal environmental law or regulation. What it does mean is that the potential for contamination exists due to the nature of the business, industry, or operation. There are a number of methods that water systems can use to work cooperatively with potential sources of contamination, such as educational visits and inspections of stored materials. Many owners of such facilities may not even be aware that they are located near a public water supply well.

Contaminant Source Inventory Process

A two-phased contaminant inventory of the study area was conducted during 2002. The first phase involved identifying and documenting potential contaminant sources within the D and M Water Association source water assessment area through the use of computer databases and Geographic Information System (GIS) maps developed by DEQ. The second, or enhanced, phase of the contaminant inventory involved contacting the operator to validate the sources identified in phase one and to add additional potential sources that exist within the delineated area. When the enhanced inventory was conducted (January 2002), there was no response from the operator, and no additional potential contaminant sources were incorporated into the assessment. Figures with well locations, delineated areas, and potential contaminant sources are provided with this report (Figure 2). Potential contaminant sources have been given a unique site number that references tabular information associated with the public water wells (Table 1).

Table 1. D and M Water Association Well #1, Well #2, Well #3 and Well #4 Potential Contaminant Inventory.

| Site Number | Source Description | TOT Zone ¹ (Years) | Source Information | Potential Contaminants ² |
|-------------|------------------------|-------------------------------|--------------------|-------------------------------------|
| 1 | WLAP Site ³ | 0-3 | Database Inventory | IOC, Microbes |
| | Interstate 15 | 0-3 | GIS Map | IOC, VOC, SOC, Microbes |
| | Fort Hall Main Canal | 0-3 | GIS Map | IOC, VOC, SOC, Microbes |

¹ TOT = time-of-travel (in years) for a potential contaminant to reach the wellhead

² IOC = inorganic chemical, VOC = volatile organic chemical, SOC = synthetic organic chemical

³ WLAP Site = Wastewater Land Application Site

Potential contaminant sources identified within the delineated TOT zone include a major transportation corridor (Interstate 15) and a major surface water source (the Fort Hall Main Canal). Major transportation corridors and surface water sources could potentially contaminate the ground water through herbicide usage and/or by accidental spills or releases. There is a municipal wastewater land application (WLAP) site. The WLAP site is potentially a non-point source for inorganic and microbial contaminants. In the Ground Water Under Direct Influence (GWUDI) Field Survey conducted in December 1995, possible contaminant sources were identified near the wells, but were outside the sanitary setback. Well #1 and Well #2, shows several septic tanks and horses kept within 500 feet from the wells. Well #3 and Well #4 shows several septic tanks, horses, and a small irrigation ditch (contains water less than 60 days of the year) within 500 feet from the wells (DEQ, 1995). Although these contaminant sources may be minor, they are near the wellheads and could increase the chances of contaminants reaching the system's drinking water sources.

Section 3. Susceptibility Analyses

Each well's susceptibility to contamination was ranked as high, moderate, or low risk according to the following considerations: hydrologic characteristics, physical integrity of the well, land use characteristics, and potentially significant contaminant sources. The susceptibility rankings are specific to a particular potential contaminant or category of contaminants. Therefore, a high susceptibility rating relative to one potential contaminant does not mean that the water system is at the same risk for all other potential contaminants. The relative ranking that is derived for a well is a qualitative, screening-level step that, in many cases, uses generalized assumptions and best professional judgement. Attachment A contains a susceptibility analysis worksheet for each well in the assessment. The following summaries describe the rationale for the susceptibility ranking.

Hydrologic Sensitivity

The hydrologic sensitivity of a well is dependent upon four factors. These factors are surface soil composition, the material in the vadose zone (between the land surface and the water table), the depth to first ground water, and the presence of a 50-foot thick fine-grained zone above the water producing zone of the well. Slowly draining soils such as silt and clay typically are more protective of ground water than coarse-grained soils such as sand and gravel. Similarly, fine-grained sediments in the subsurface, and a water depth of more than 300 feet from the surface protect the ground water from contamination. Also, with all factors equal, water taken from a greater ground water depth will result in contaminant reduction through absorption and/or other dispersion mechanisms (Idaho Source Water Assessment Plan, 1999, p. E-59).

Hydrologic sensitivity was rated high for Well #1, Well #2 and Well #3, whereas, Well #4 rated moderate. (Table 2). This is based upon regional soil classifications as moderate to well drained. The vadose zone composition for Well #1, Well #2 and Well #3 is unknown because well log information was unavailable to assess the subsurface composition. The vadose zone for Well #4 consists of predominantly brown clay (40 feet) with units of gravel (16 feet), and brown clay intermixed with gravel (14 feet). According to the well log for Well #4, the static water level is 65-feet below ground surface. Based upon the static water level data for Well #4, the depth to first ground water is less than 300-feet from the surface. No well log information was available to assess the first depth to ground water for Well #1, Well #2 and Well #3. Whether a 50-foot thick fine-grained zone is present in the subsurface for Well #1, Well #2 and Well #3 is unknown. The well log for Well #4 shows a cumulative thickness of clay that is greater than 50-feet and is above the perforated zones of the well casing.

Well Construction

Well construction directly affects the ability of the well to protect the aquifer from contaminants. System construction scores are reduced when information shows that potential contaminants will have a more difficult time reaching the intake of the well. Lower scores imply a system that can better protect the water. If the casing and annular seal both extend into a low permeability unit then the possibility of cross contamination from other aquifer layers is reduced and the system construction score goes down. If the highest production interval is more than 100 feet below the water table, then the system is considered to have better buffering capabilities.

When information was adequate, a determination was made as to whether the casing and annular seals extend into low permeability units and whether current PWS construction standards are met.

The system construction scores were rated moderate for Well #1, Well #2 and Well #3, and Well #4. Well drilling information was not available for Well #1, Well #2 and Well #3. If well log information is made available, the susceptibility scores for the wells could change because proper well construction is important when evaluating the susceptibility of drinking water sources to contamination.

The IDWR *Well Construction Standards Rules (1993)* require all public water systems (PWSs) to follow DEQ standards. IDAPA 58.01.08.550 requires that PWSs follow the *Recommended Standards for Water Works (1997)* during construction. Under current standards, all PWS wells are required to have a 50-foot buffer around the wellhead. These standards are used to rate the system construction for the well by evaluating items such as condition of wellhead and surface seal, whether the casing and annular space is within

consolidated material or 18 feet below the surface, the thickness of the casing, etc. Pump tests for wells producing greater than 50 gallons per minute (gpm) require a minimum of a 6-hour test. If all criteria are not met, the public water source does not meet the IDWR Well Construction Standards. For D and M Water Association, all wells did not meet all the well construction standards for a public water system.

For all wells, the wellheads and surface seals are considered maintained and in acceptable condition. Improvements made since the last sanitary survey include installation of approved casing vents on Well #1, Well #2 and Well #3 (Carlson, 1999). For Well #1, Well #2 and Well #3, no information was available to assess whether the wells' annular seals and well casings extended into low permeable material. The casing thickness for Well #1, Well #2 and Well #3 is 0.250-inch on 6-inch diameter casings (DEQ Sanitary Survey, 2001). No pump test information was available for Well #1, Well #2 and Well #3 to establish whether the wells met DEQ requirements. It is also unknown whether Well #1, Well #2 and Well #3 highest water-producing zone were least 100 feet below the static water level.

According to well log information, Well #4 has an annular seal that extends 18-feet below the surface into brown clay, but the casing extends into loose gray shale. Well #4 has a 10-inch diameter casing (+1 to 132-feet), an 8-inch diameter casing (126 to 226-feet), and a 6-inch diameter casing (205 to 568-feet). The different casing diameters for Well #4 are 0.250-inch thick. The recommended casing thickness for the wells is 0.365-inch for a 10-inch diameter casing, 0.322-inch for an 8-inch diameter casing, and 0.280-inch for a 6-inch diameter casing. A thicker casing may prolong the life of the well. The pump test for Well #4 shows a discharge of 100 gallons per minute (gpm) to a pumping level of 210 feet for one hour. The recommended pump test standard is less than 50 gpm in a four-hour period. Well #4 highest water production interval is in the perforated zones between 535-feet and 550-feet and is greater than 100-feet below the well's status water level. When water is drawn from deeper levels of the aquifer, it may provide a buffer from contaminants.

All wells are located outside of a 100-year floodplain. This may decrease the chance of contaminants being drawn into the drinking water source from surface water flooding. Protection from surface water flooding is highly dependent on proper well and well house construction.

Potential Contaminant Source and Land Use

The potential contaminant sources and land use within the delineated zone of water contribution is assessed to determine each well's susceptibility. When agriculture is the predominant land use in the area, this may increase the likelihood of agricultural wastewater infiltrating the ground water system. Agricultural land is counted as a source of leachable contaminants and points are assigned to this rating based on the percentage of agricultural land. The land use in this area is considered irrigated cropland.

In terms of potential contaminant sources and land use susceptibility, all wells rated moderate for IOCs (i.e., nitrates), VOCs (i.e. petroleum related products), SOC (i.e., pesticides) and microbial contaminants (i.e., fecal coliform). Refer to Table 1 for a complete list of sources identified in the potential contaminant inventory.

Final Susceptibility Rating

A detection above a drinking water standard (MCL), any detection of a VOC or SOC, or having potential contaminant sources within 50 feet of the wellhead will automatically give a high susceptibility rating to the final well ranking despite the land use of the area because a pathway for contamination already exists. If potential contaminant sources are within 50 feet of a wellhead, this will automatically lead to a high susceptibility rating. Hydrologic sensitivity and system construction scores are heavily weighted in the final scores. Having multiple potential contaminant sources in the 0 to 3-year time of travel zone (Zone 1B), and a large percentage of agricultural land contribute greatly to the overall ranking.

The final susceptibility rankings are: Well #1, Well #2 and Well #3 are high for IOCs, VOCs, SOC, and microbial contaminants. Well #4 rated moderate for IOCs, VOCs, SOC, and microbial contaminants. These ratings reflect the hydrologic sensitivity, system construction, and potential contaminants inventory and land use within the delineated source water assessment areas for the D and M Water Association wells. Refer to Table 2 for the Susceptibility Analysis Summary.

Table 2. Summary of D and M Water Association Susceptibility Analysis.

| Drinking Water Source | Susceptibility Scores | | | | | | | | | |
|-----------------------|------------------------|---|-----|-----|------------|---------------------|------------------------------|-----|-----|------------|
| | Hydrologic Sensitivity | Potential Contaminant ¹ Inventory and Land Use | | | | System Construction | Final Susceptibility Ranking | | | |
| | | IOC | VOC | SOC | Microbials | | IOC | VOC | SOC | Microbials |
| Well #1 | H | M | M | M | M | M | H | H | H | H |
| Well #2 | H | M | M | M | M | M | H | H | H | H |
| Well #3 | H | M | M | M | M | M | H | H | H | H |
| Well #4 | M | M | M | M | M | M | M | M | M | M |

H = High Susceptibility, M = Moderate Susceptibility, L = Low Susceptibility; ¹IOC = inorganic chemical, VOC = volatile organic chemical, SOC = synthetic organic chemical

Susceptibility Summary

The IOCs (arsenic, barium, chromium, fluoride, mercury, and nitrate) and RADs (gross alpha, gross beta) represent the main water chemistry recorded for the D and M Water Association public water system. The reported concentrations of these chemicals were below the MCL for each chemical. All water chemistry tests for the D and M Water Association wells have not detected VOCs and SOC.

Although there were detections of arsenic in June 1989 and November 1999, the results were below the MCL of 0.05 mg/L. In October 2001, the EPA lowered the arsenic MCL to 0.01 mg/L, giving systems until 2006 to comply with the new standard. The nitrate levels in the D and M Water Association wells were below the action level (met or exceeded half the MCL of 10.0 mg/L). If nitrate levels increase the system will want to look into remediation to reduce nitrate concentrations.

Total coliform bacteria were detected in 1998 at various locations within the distribution system. When bacteria was identified in July and November 1998, boil advisories were required. Since November 1998, no total coliform bacteria have been detected in the system.

In this area, the county level nitrogen fertilizer use is considered low, and the herbicide use and overall agriculture-chemical use are moderate. This is related to the amount of agricultural land in this area. Although there may only be a small portion of agriculture land in the direct vicinity of the wellheads, it is useful as a tool in determining the overall chemical usage such as pesticides, and how they may impact ground water through infiltration and surface water runoff. Potential contaminant sources were identified within the wells 3-year TOT delineated capture zone and were documented (Figure 2 and Table 1).

Section 4. Options for Drinking Water Protection

This assessment should be used as a basis for determining appropriate new protection measures or re-evaluating existing protection efforts. No matter what ranking a source receives, protection is always important. Whether the source is currently located in a “pristine” area or an area with numerous industrial and/or agricultural land uses that require surveillance, the way to ensure good water quality in the future is to act now to protect valuable water supply resources. If the system should need to expand in the future, new well sites should be located in areas with as few potential sources of contamination as possible, and the site should be reserved and protected for this specific use.

An effective drinking water protection program is tailored to the particular local drinking water protection area. A community with a fully developed drinking water protection program will incorporate many strategies. For drinking water protection, the D and M Water Association should focus on correcting any deficiencies that were outlined in the sanitary survey. The wellheads need to be properly maintained and protected. Protection includes no application or storage of herbicides, pesticides or other chemicals within 50 feet from the wellhead. Limiting road access near wellheads may reduce the potential for contamination from spills or releases. If microbial contamination becomes a concern, the system should take appropriate measures to disinfect the system. If nitrates or other IOC levels increase, the system should investigate remediation options such as reverse osmosis.

According to a press release posted on the EPA website (www.epa.gov), the EPA intends to provide up to \$20 million over the next two years for research and development of more cost-effective technologies to help small systems meet the new standard and provide technical assistance to small system operators. EPA has released an issue paper, identifying and summarizing experiences with proven aboveground treatment alternatives for arsenic in ground water, and provides information on their relative effectiveness and cost (EPA 542-S-02-002). The EPA has also stated that it “will work with small communities to maximize grants and loans under current State Revolving Fund and Rural Utilities Service programs of the Department of Agriculture” (USEPA, 2001, para 5).

Once drinking water wells are protected, the system can focus on documenting types and locations of potential contaminant sources. These potential contaminant sources can be point sources, such as a new gas station, or non-point sources, such as storm water runoff. Any new sources that may be considered potential contaminants should be investigated and if need be monitored to prevent future contamination. Land uses within the area should also be evaluated. Areas with higher than normal agricultural land use may have increases in agricultural wastewater runoff that could infiltrate the ground water. Land uses within most of the source water assessment area are beyond the boundaries of D and M Water Association. Therefore partnerships with federal, state and local agencies, industrial and commercial groups should be established to ensure future land uses are protective of ground water quality. Educating employees and the public about source water will further assist the system in its monitoring and protection efforts.

Due to the time involved with the movement of ground water, drinking water protection activities should be aimed at long-term management strategies even though these strategies may not yield results in the near term. A strong public education program should be a primary focus of any drinking water protection plan. Public education topics could include proper lawn and garden care practices, household hazardous waste disposal methods, proper care and maintenance of septic systems, and the importance of water conservation to name but a few. There are multiple resources available to help communities implement protection programs, including the Drinking Water Academy of the EPA. Drinking water protection activities for agriculture should be coordinated with the Idaho State Department of Agriculture and the Bannock County Soil and Water Conversation District. As major transportation corridors intersect the delineation (such as Interstate 15), the Idaho Department of Transportation should be involved in protection efforts. If the system should need to expand in the future, new well sites should be located in areas with as few potential sources of contamination as possible, and the site should be reserved and protected for this specific use.

A system must incorporate a variety of strategies in order to develop a comprehensive drinking water protection plan, be they regulatory in nature (i.e. zoning ordinances) or non-regulatory (i.e. public education, specific best management practices). For assistance in developing protection strategies please contact the Pocatello Regional Office of the DEQ or the Idaho Rural Water Association.

Assistance

Public water supplies and others may call the following DEQ offices with questions about this assessment and to request assistance with developing and implementing a local protection plan. In addition, draft protection plans may be submitted to the DEQ office for preliminary review and comments.

DEQ Pocatello Regional Office (208) 236-6160

DEQ State Office (208) 373-0502

Website: <http://www.deq.state.id.us>

Water suppliers serving fewer than 10,000 persons may contact Ms. Melinda Harper at (208) 343-7001 or email her at mharper@idahoruralwater.com for assistance with drinking water protection (formerly wellhead protection) strategies.

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POTENTIAL CONTAMINANT INVENTORY

LIST OF ACRONYMS AND DEFINITIONS

AST (Aboveground Storage Tanks) – Sites with aboveground storage tanks.

Business Mailing List – This list contains potential contaminant sites identified through a yellow pages database search of standard industry codes (SIC).

CERCLIS – This includes sites considered for listing under the **Comprehensive Environmental Response Compensation and Liability Act (CERCLA)**. CERCLA, more commonly known as A Superfund is designed to clean up hazardous waste sites that are on the national priority list (NPL).

Cyanide Site – DEQ permitted and known historical sites/facilities using cyanide.

Dairy – Sites included in the primary contaminant source inventory represent those facilities regulated by Idaho State Department of Agriculture (ISDA) and may range from a few head to several thousand head of milking cows.

Deep Injection Well – Injection wells regulated under the Idaho Department of Water Resources generally for the disposal of stormwater runoff or agricultural field drainage.

Enhanced Inventory – Enhanced inventory locations are potential contaminant source sites added by the water system. These can include new sites not captured during the primary contaminant inventory, or corrected locations for sites not properly located during the primary contaminant inventory. Enhanced inventory sites can also include miscellaneous sites added by the Idaho Department of Environmental Quality (DEQ) during the primary contaminant inventory.

Floodplain – This is a coverage of the 100-year floodplains.

Group 1 Sites – These are sites that show elevated levels of contaminants and are not within the priority one areas.

Inorganic Priority Area – Priority one areas where greater than 25% of the wells/springs show constituents higher than primary standards or other health standards.

Landfill – Areas of open and closed municipal and non-municipal landfills.

LUST (Leaking Underground Storage Tank) – Potential contaminant source sites associated with leaking underground storage tanks as regulated under RCRA.

Mines and Quarries – Mines and quarries permitted through the Idaho Department of Lands.)

Nitrate Priority Area – Area where greater than 25% of wells/springs show nitrate values above 5 mg/L.

NPDES (National Pollutant Discharge Elimination System) – Sites with NPDES permits. The Clean Water Act requires that any discharge of a pollutant to waters of the United States from a point source must be authorized by an NPDES permit.

Organic Priority Areas – These are any areas where greater than 25 % of wells/springs show levels greater than 1% of the primary standard or other health standards.

Recharge Point – This includes active, proposed, and possible recharge sites on the Snake River Plain.

RCRIS – Site regulated under **Resource Conservation Recovery Act (RCRA)**. RCRA is commonly associated with the cradle to grave management approach for generation, storage, and disposal of hazardous wastes.

SARA Tier II (Superfund Amendments and Reauthorization Act Tier II Facilities) – These sites store certain types and amounts of hazardous materials and must be identified under the Community Right to Know Act.

Toxic Release Inventory (TRI) – The toxic release inventory list was developed as part of the Emergency Planning and Community Right to Know (Community Right to Know) Act passed in 1986. The Community Right to Know Act requires the reporting of any release of a chemical found on the TRI list.

UST (Underground Storage Tank) – Potential contaminant source sites associated with underground storage tanks regulated as regulated under RCRA.

Wastewater Land Applications Sites – These are areas where the land application of municipal or industrial wastewater is permitted by DEQ.

Wellheads – These are drinking water well locations regulated under the Safe Drinking Water Act. They are not treated as potential contaminant sources.

NOTE: Many of the potential contaminant sources were located using a geocoding program where mailing addresses are used to locate a facility. Field verification of potential contaminant sources is an important element of an enhanced inventory.

Attachment A

D and M Water Association Susceptibility Analysis Worksheets

The final scores for the susceptibility analysis were determined using the following formulas:

- 1) VOC/SOC/IOC Final Score = Hydrologic Sensitivity + System Construction + (Potential Contaminant/Land Use x 0.273)
- 2) Microbial Final Score = Hydrologic Sensitivity + System Construction + (Potential Contaminant/Land Use x 0.375)

Final Susceptibility Scoring:

0 - 5 Low Susceptibility

6 - 12 Moderate Susceptibility

≥ 13 High Susceptibility

| | | | | | |
|---|--------------------|-----------|-----------|-----------|-----------------|
| 1. System Construction | | SCORE | | | |
| Drill Date | Unknown | | | | |
| Driller Log Available | NO | | | | |
| Sanitary Survey (if yes, indicate date of last survey) | YES | 2001 | | | |
| Well meets IDWR construction standards | NO | 1 | | | |
| Wellhead and surface seal maintained | YES | 0 | | | |
| Casing and annular seal extend to low permeability unit | NO | 2 | | | |
| Highest production 100 feet below static water level | NO | 1 | | | |
| Well located outside the 100 year flood plain | YES | 0 | | | |
| Total System Construction Score | | 4 | | | |
| 2. Hydrologic Sensitivity | | | | | |
| Soils are poorly to moderately drained | NO | 2 | | | |
| Vadose zone composed of gravel, fractured rock or unknown | YES | 1 | | | |
| Depth to first water > 300 feet | NO | 1 | | | |
| Aquitard present with > 50 feet cumulative thickness | NO | 2 | | | |
| Total Hydrologic Score | | 6 | | | |
| 3. Potential Contaminant / Land Use - ZONE 1A | | IOC Score | VOC Score | SOC Score | Microbial Score |
| Land Use Zone 1A | IRRIGATED CROPLAND | 2 | 2 | 2 | 2 |
| Farm chemical use high | NO | 0 | 0 | 0 | |
| IOC, VOC, SOC, or Microbial sources in Zone 1A | NO | NO | NO | NO | NO |
| Total Potential Contaminant Source/Land Use Score - Zone 1A | | 2 | 2 | 2 | 2 |
| Potential Contaminant / Land Use - ZONE 1B | | | | | |
| Contaminant sources present (Number of Sources) | YES | 3 | 2 | 2 | 3 |
| (Score = # Sources X 2) 8 Points Maximum | | 6 | 4 | 4 | 6 |
| Sources of Class II or III leacheable contaminants or | YES | 7 | 2 | 2 | |
| 4 Points Maximum | | 4 | 2 | 2 | |
| Zone 1B contains or intercepts a Group 1 Area | YES | 2 | 0 | 0 | 0 |
| Land use Zone 1B Greater Than 50% Irrigated Agricultural Land | | 4 | 4 | 4 | 4 |
| Total Potential Contaminant Source / Land Use Score - Zone 1B | | 16 | 10 | 10 | 10 |
| Cumulative Potential Contaminant / Land Use Score | | 18 | 12 | 12 | 12 |
| 4. Final Susceptibility Source Score | | 15 | 13 | 13 | 15 |
| 5. Final Well Ranking | | High | High | High | High |

1. System Construction

SCORE

| | | |
|---|---------|------|
| Drill Date | Unknown | |
| Driller Log Available | NO | |
| Sanitary Survey (if yes, indicate date of last survey) | YES | 2001 |
| Well meets IDWR construction standards | NO | 1 |
| Wellhead and surface seal maintained | YES | 0 |
| Casing and annular seal extend to low permeability unit | NO | 2 |
| Highest production 100 feet below static water level | NO | 1 |
| Well located outside the 100 year flood plain | YES | 0 |

Total System Construction Score 4

2. Hydrologic Sensitivity

| | | |
|---|-----|---|
| Soils are poorly to moderately drained | NO | 2 |
| Vadose zone composed of gravel, fractured rock or unknown | YES | 1 |
| Depth to first water > 300 feet | NO | 1 |
| Aquitard present with > 50 feet cumulative thickness | NO | 2 |

Total Hydrologic Score 6

3. Potential Contaminant / Land Use - ZONE 1A

| IOC Score | VOC Score | SOC Score | Microbial Score |
|-----------|-----------|-----------|-----------------|
|-----------|-----------|-----------|-----------------|

| | | | | | |
|---|--------------------|----|----|----|----|
| Land Use Zone 1A | IRRIGATED CROPLAND | 2 | 2 | 2 | 2 |
| Farm chemical use high | NO | 0 | 0 | 0 | |
| IOC, VOC, SOC, or Microbial sources in Zone 1A | NO | NO | NO | NO | NO |
| Total Potential Contaminant Source/Land Use Score - Zone 1A | | 2 | 2 | 2 | 2 |

Potential Contaminant / Land Use - ZONE 1B

| | | | | | |
|---|-----|---|---|---|---|
| Contaminant sources present (Number of Sources) | YES | 3 | 2 | 2 | 3 |
| (Score = # Sources X 2) 8 Points Maximum | | 6 | 4 | 4 | 6 |
| Sources of Class II or III leacheable contaminants or | YES | 7 | 2 | 2 | |
| 4 Points Maximum | | 4 | 2 | 2 | |
| Zone 1B contains or intercepts a Group 1 Area | YES | 2 | 0 | 0 | 0 |
| Land use Zone 1B Greater Than 50% Irrigated Agricultural Land | | 4 | 4 | 4 | 4 |

Total Potential Contaminant Source / Land Use Score - Zone 1B 16 10 10 10

Cumulative Potential Contaminant / Land Use Score 18 12 12 12

4. Final Susceptibility Source Score

15 13 13 15

5. Final Well Ranking

High High High High

1. System Construction

SCORE

| | | |
|---|---------|------|
| Drill Date | Unknown | |
| Driller Log Available | NO | |
| Sanitary Survey (if yes, indicate date of last survey) | YES | 2001 |
| Well meets IDWR construction standards | NO | 1 |
| Wellhead and surface seal maintained | YES | 0 |
| Casing and annular seal extend to low permeability unit | NO | 2 |
| Highest production 100 feet below static water level | NO | 1 |
| Well located outside the 100 year flood plain | YES | 0 |

Total System Construction Score 4

2. Hydrologic Sensitivity

| | | |
|---|-----|---|
| Soils are poorly to moderately drained | NO | 2 |
| Vadose zone composed of gravel, fractured rock or unknown | YES | 1 |
| Depth to first water > 300 feet | NO | 1 |
| Aquitard present with > 50 feet cumulative thickness | NO | 2 |

Total Hydrologic Score 6

3. Potential Contaminant / Land Use - ZONE 1A

| IOC Score | VOC Score | SOC Score | Microbial Score |
|-----------|-----------|-----------|-----------------|
|-----------|-----------|-----------|-----------------|

| | | | | | |
|---|--------------------|----|----|----|----|
| Land Use Zone 1A | IRRIGATED CROPLAND | 2 | 2 | 2 | 2 |
| Farm chemical use high | NO | 0 | 0 | 0 | |
| IOC, VOC, SOC, or Microbial sources in Zone 1A | NO | NO | NO | NO | NO |
| Total Potential Contaminant Source/Land Use Score - Zone 1A | | 2 | 2 | 2 | 2 |

Potential Contaminant / Land Use - ZONE 1B

| | | | | | |
|---|-----|---|---|---|---|
| Contaminant sources present (Number of Sources) | YES | 3 | 2 | 2 | 3 |
| (Score = # Sources X 2) 8 Points Maximum | | 6 | 4 | 4 | 6 |
| Sources of Class II or III leacheable contaminants or | YES | 7 | 2 | 2 | |
| 4 Points Maximum | | 4 | 2 | 2 | |
| Zone 1B contains or intercepts a Group 1 Area | YES | 2 | 0 | 0 | 0 |
| Land use Zone 1B Greater Than 50% Irrigated Agricultural Land | | 4 | 4 | 4 | 4 |

Total Potential Contaminant Source / Land Use Score - Zone 1B 16 10 10 10

Cumulative Potential Contaminant / Land Use Score 18 12 12 12

4. Final Susceptibility Source Score

15 13 13 15

5. Final Well Ranking

High High High High

Ground Water Susceptibility Report

Public Water System Name : D AND M WATER ASSN
Public Water System Number 6030010

Well# : #4 WELL

7/29/02 11:02:25 AM

1. System Construction

SCORE

| | | |
|---|---------|------|
| Drill Date | 7/23/88 | |
| Driller Log Available | YES | |
| Sanitary Survey (if yes, indicate date of last survey) | YES | 2001 |
| Well meets IDWR construction standards | NO | 1 |
| Wellhead and surface seal maintained | YES | 0 |
| Casing and annular seal extend to low permeability unit | NO | 2 |
| Highest production 100 feet below static water level | YES | 0 |
| Well located outside the 100 year flood plain | YES | 0 |

Total System Construction Score 3

2. Hydrologic Sensitivity

| | | |
|---|-----|---|
| Soils are poorly to moderately drained | NO | 2 |
| Vadose zone composed of gravel, fractured rock or unknown | NO | 0 |
| Depth to first water > 300 feet | NO | 1 |
| Aquitard present with > 50 feet cumulative thickness | YES | 0 |

Total Hydrologic Score 3

3. Potential Contaminant / Land Use - ZONE 1A

| IOC Score | VOC Score | SOC Score | Microbial Score |
|-----------|-----------|-----------|-----------------|
|-----------|-----------|-----------|-----------------|

| | | | | | |
|---|--------------------|----|----|----|----|
| Land Use Zone 1A | IRRIGATED CROPLAND | 2 | 2 | 2 | 2 |
| Farm chemical use high | NO | 0 | 0 | 0 | |
| IOC, VOC, SOC, or Microbial sources in Zone 1A | NO | NO | NO | NO | NO |
| Total Potential Contaminant Source/Land Use Score - Zone 1A | | 2 | 2 | 2 | 2 |

Potential Contaminant / Land Use - ZONE 1B

| | | | | | |
|---|-----|---|---|---|---|
| Contaminant sources present (Number of Sources) | YES | 3 | 2 | 2 | 3 |
| (Score = # Sources X 2) 8 Points Maximum | | 6 | 4 | 4 | 6 |
| Sources of Class II or III leacheable contaminants or | YES | 7 | 2 | 2 | |
| 4 Points Maximum | | 4 | 2 | 2 | |
| Zone 1B contains or intercepts a Group 1 Area | YES | 2 | 0 | 0 | 0 |
| Land use Zone 1B Greater Than 50% Irrigated Agricultural Land | | 4 | 4 | 4 | 4 |

Total Potential Contaminant Source / Land Use Score - Zone 1B 16 10 10 10

Cumulative Potential Contaminant / Land Use Score 18 12 12 12

4. Final Susceptibility Source Score

| | | | |
|----|---|---|----|
| 11 | 9 | 9 | 11 |
|----|---|---|----|

5. Final Well Ranking

| | | | |
|----------|----------|----------|----------|
| Moderate | Moderate | Moderate | Moderate |
|----------|----------|----------|----------|